

985.00

984.00

983.00










982.00

0.00 50.0 66.0 100.0 150.0

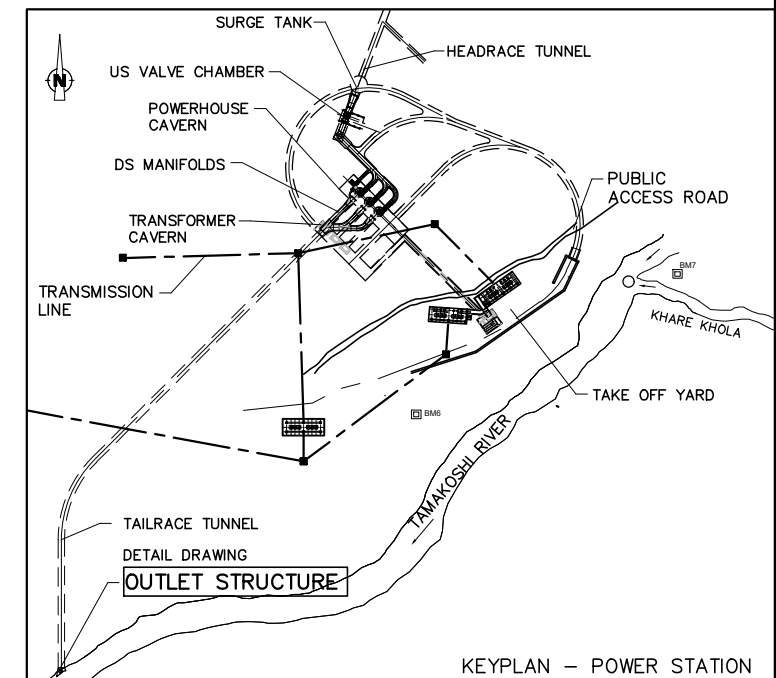
TAILWATER IN TAMAKOSHI RIVER BELOW SILL

TAILWATER RATED CONDITION

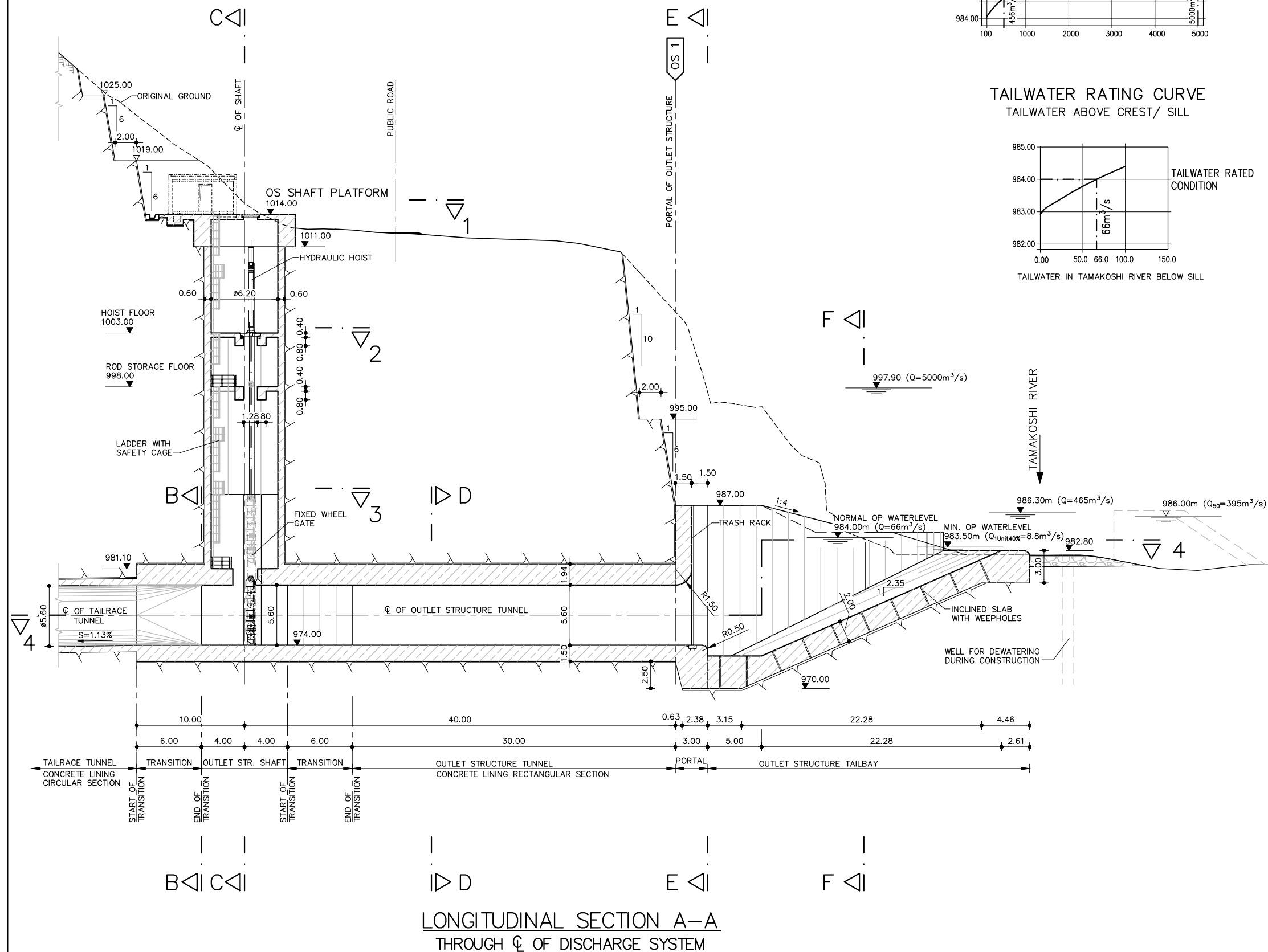
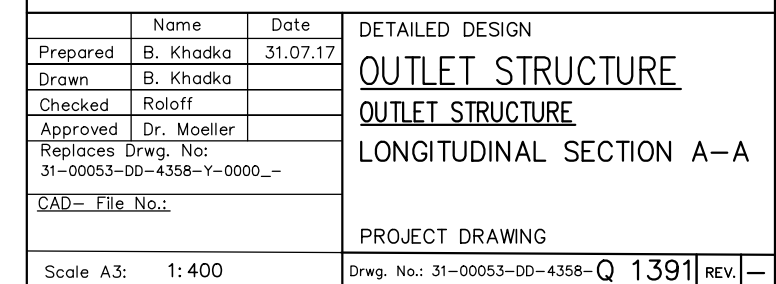
66m³/s

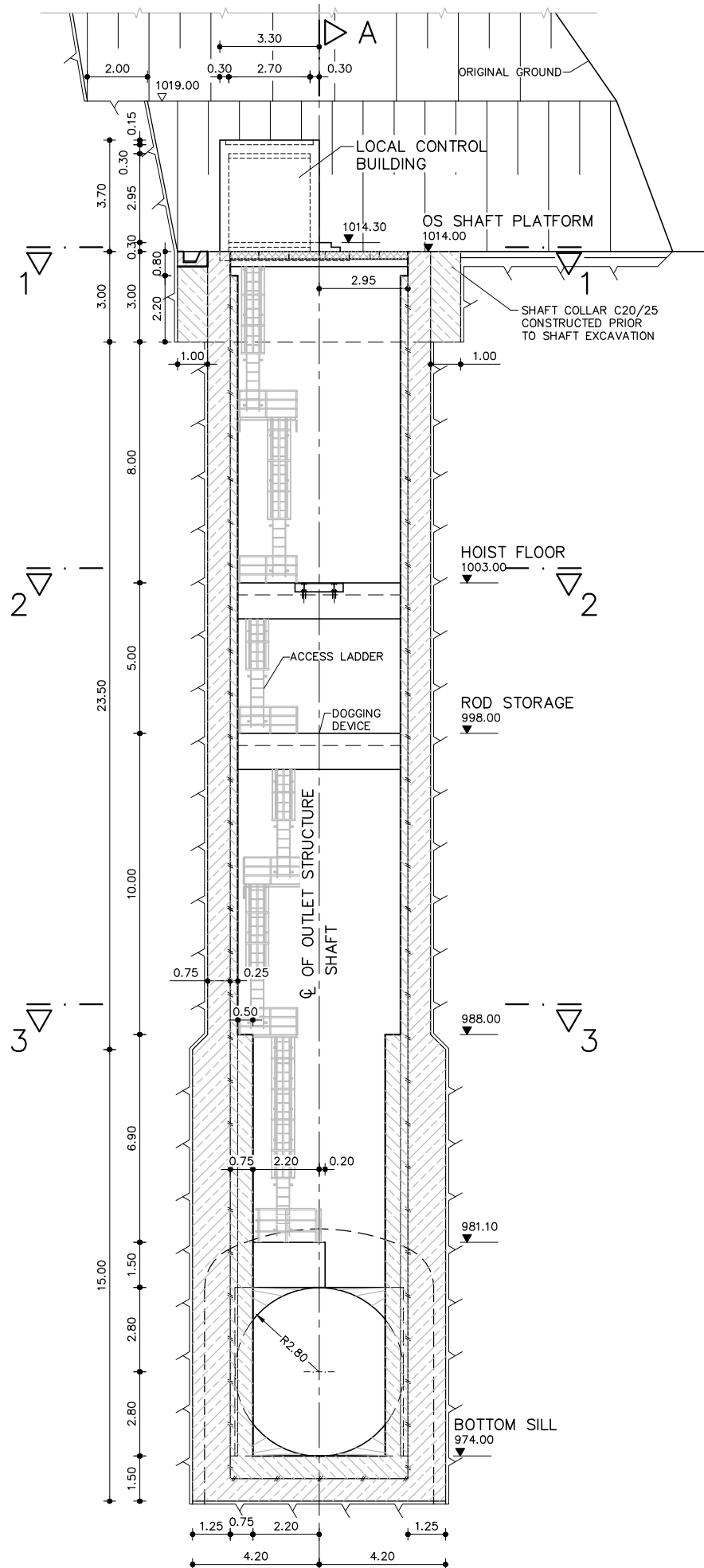
 CONCRETE CLASS C1 – CONCRETE C25/30
 CONCRETE CLASS D – PREFABRICATED CONCRETE C35/45
 CONCRETE CLASS F – BLINDING CONCRETE C12/15
 CONSTRUCTION JOINTS
  UNFINISHED TOP OF SLAB
  FINISHED FLOOR LEVEL
 FIXPOINT–COORDINATE

DRAFT STATUS:
 01.11.2018

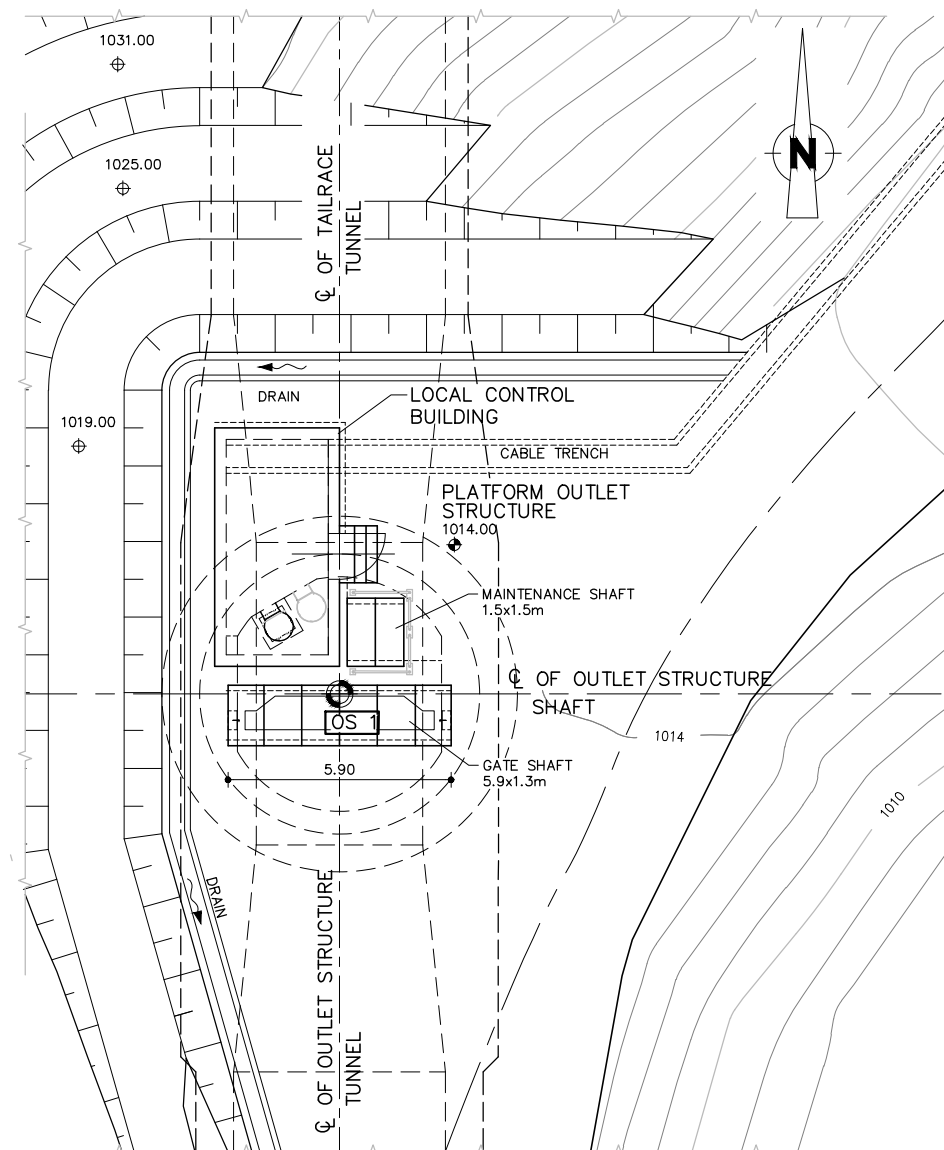


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| Revisions | | | | |
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| | Name | Date | Notes | |

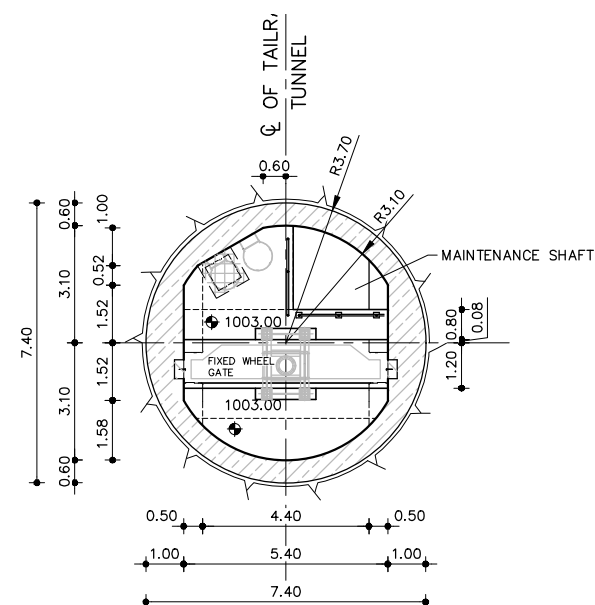




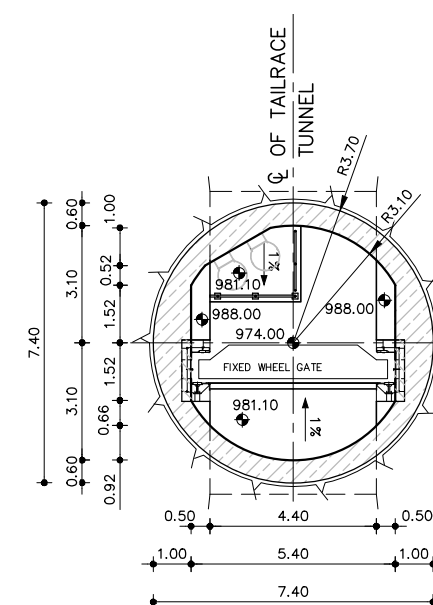
SECTION C-C
THROUGH CL OF SHAFT



SECTION 1-1
OS SHAFT PLATFORM EL. 1014.00



SECTION 2-2
HOIST FLOOR EL. 1003.00



SECTION 3-3
EL. 988.00

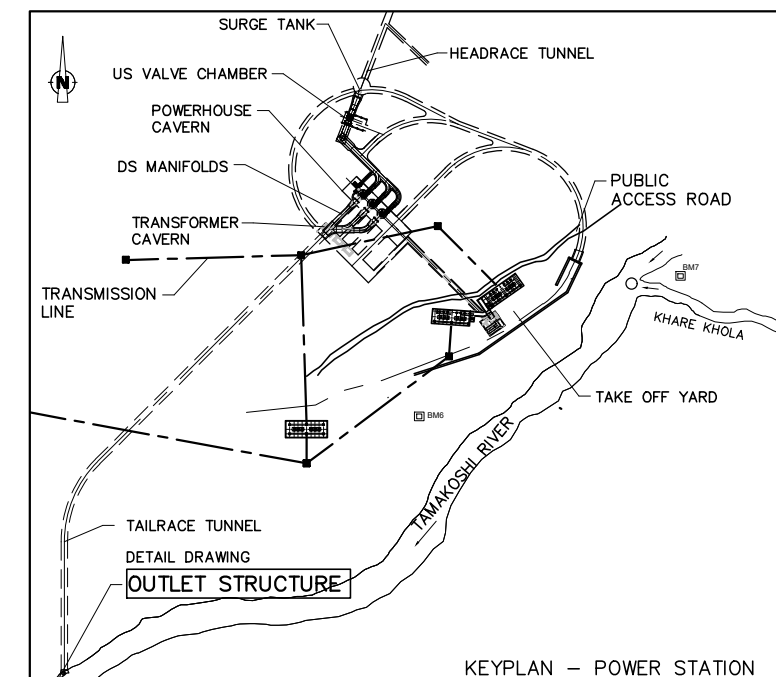
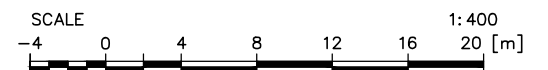
NOTES:

1. ALL DIMENSIONS ARE IN METERS [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).

LEGEND:

- CONCRETE CLASS C1 - CONCRETE C25/30
- CONCRETE CLASS F - BLINDING CONCRETE C12/15
- CONSTRUCTION JOINTS
- UNFINISHED TOP OF SLAB
- FINISHED FLOOR LEVEL
- FIXPOINT-COORDINATE

DRAFT STATUS:
01.11.2018



Reference Drawings

| Drwg. No. | Title |
|-----------------------|--------------------------|
| 31-00053-DD-4358-1390 | OUTLET STRUCTURE, LAYOUT |

Revisions

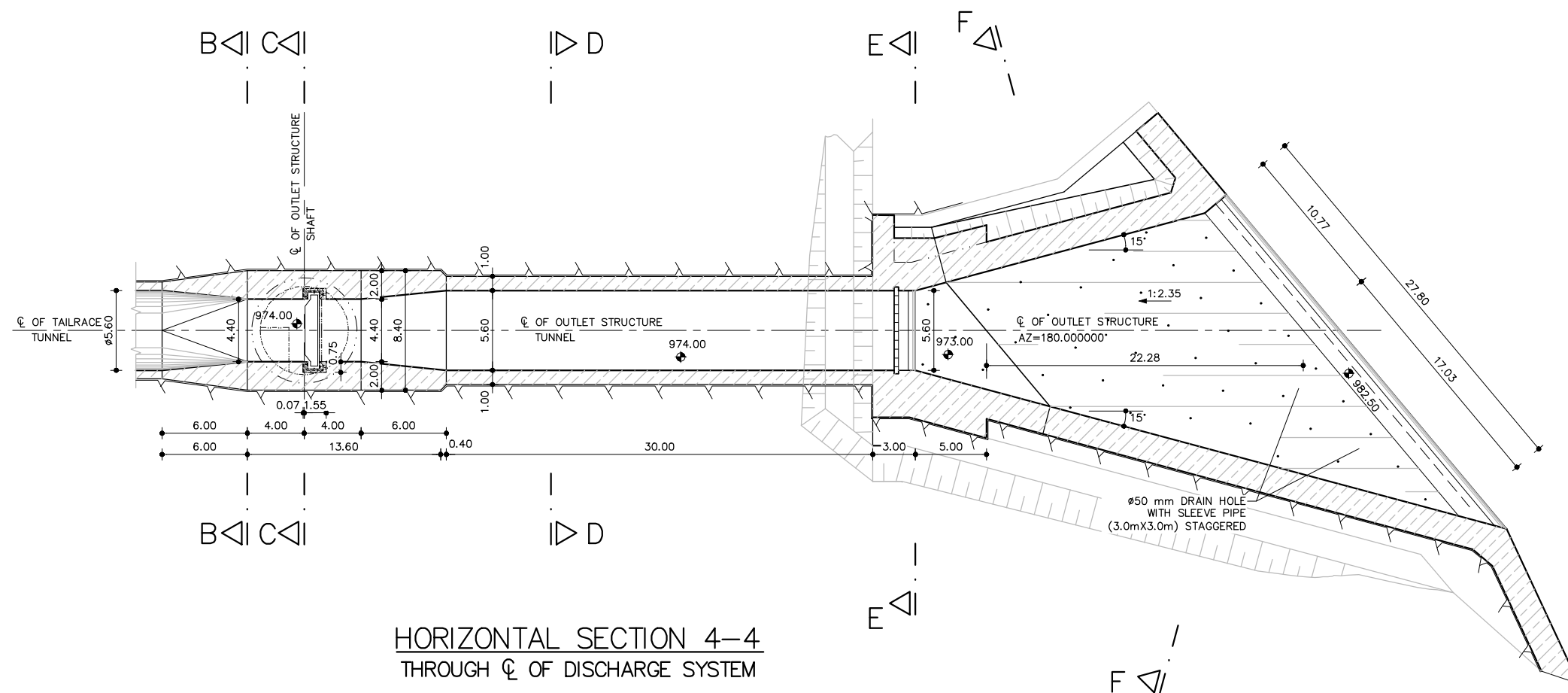
| Name | Date | Notes |
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TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY

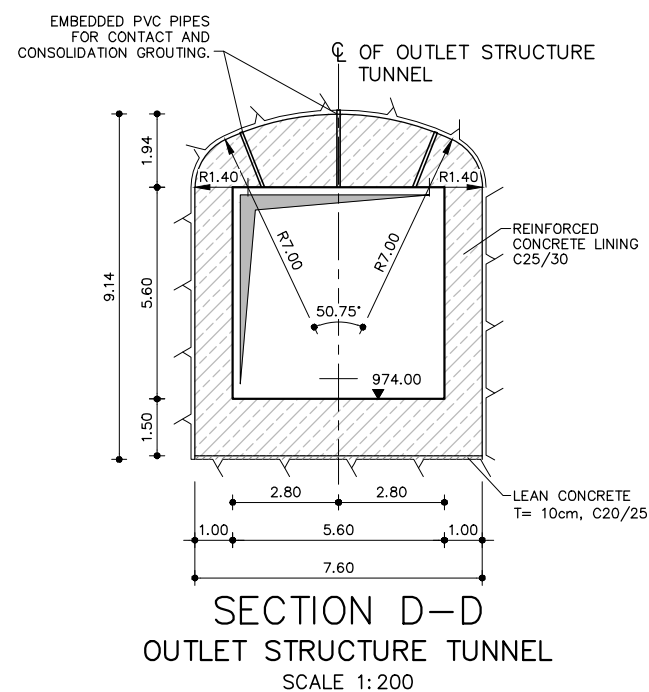
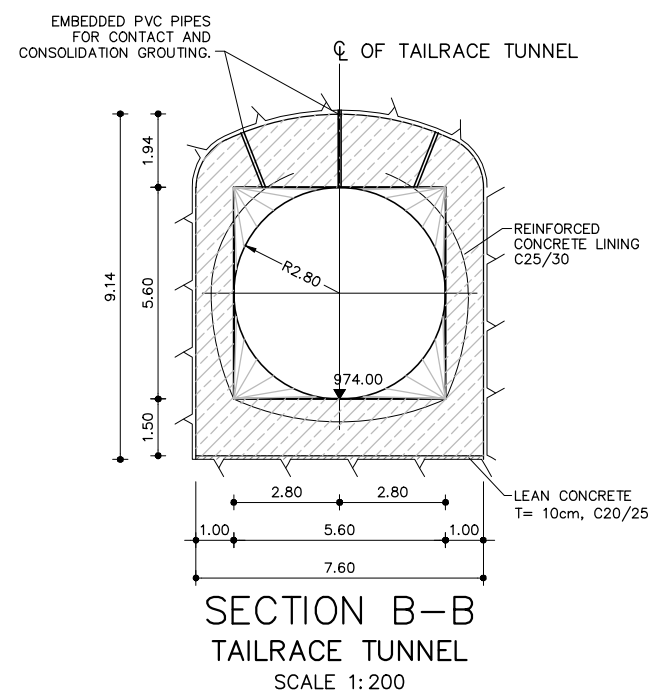
LAHMEYER INTERNATIONAL
CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

| Name | Date | DETAILLED DESIGN |
|---|----------|------------------------|
| Prepared B. Khadka | 31.07.17 | OUTLET STRUCTURE |
| Drawn B. Khadka | | OUTLET STRUCTURE SHAFT |
| Checked Roloff | | SECTIONS |
| Approved Dr. Moeller | | |
| Replaces Drwg. No: 31-00053-DD-4358-Y-0000_ | | |
| CAD- File No.: | | |
| Scale A3: 1:200 | | PROJECT DRAWING |
| Drwg. No.: 31-00053-DD-4358-Q 1392 | REV. - | |



HORIZONTAL SECTION 4-4
THROUGH ϕ OF DISCHARGE SYSTEM



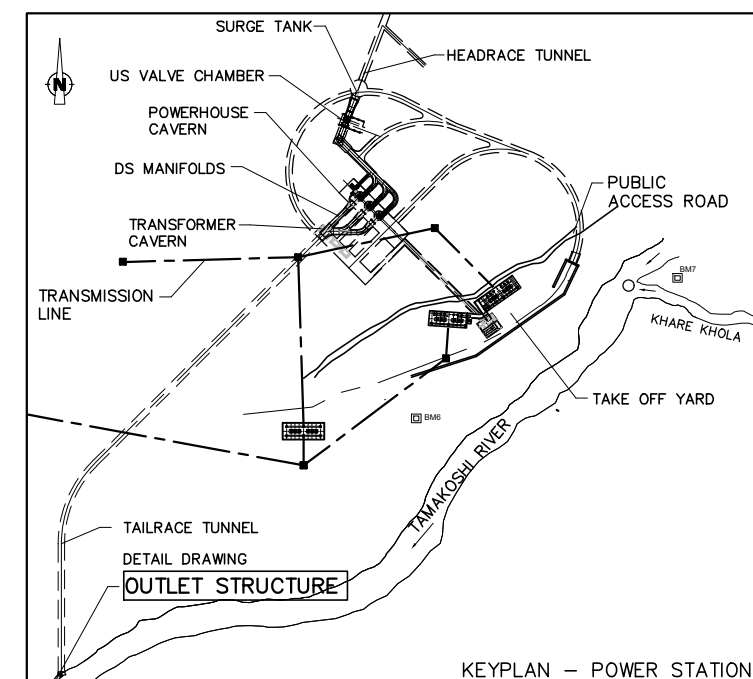
NOTES:

1. ALL DIMENSIONS ARE IN METERS [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).

LEGEND:

- CONCRETE CLASS C1 - CONCRETE C25/30
- CONCRETE CLASS D - PREFABRICATED CONCRETE C35/45
- CONCRETE CLASS F - BLINDING CONCRETE C12/15
- CONSTRUCTION JOINTS
- UNFINISHED TOP OF SLAB
- FINISHED FLOOR LEVEL
- FIXPOINT-COORDINATE

DRAFT STATUS:
01.11.2018



Reference Drawings

| Drwg. No. | Title |
|-----------------------|---|
| 31-00053-DD-4356-1370 | DOWNSTREAM POWER WATERWAYS, GENERAL, LAYOUT |

| Revisions | Name | Date | Notes |
|-----------|------|------|-------|
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TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY

LAHMEYER INTERNATIONAL
CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

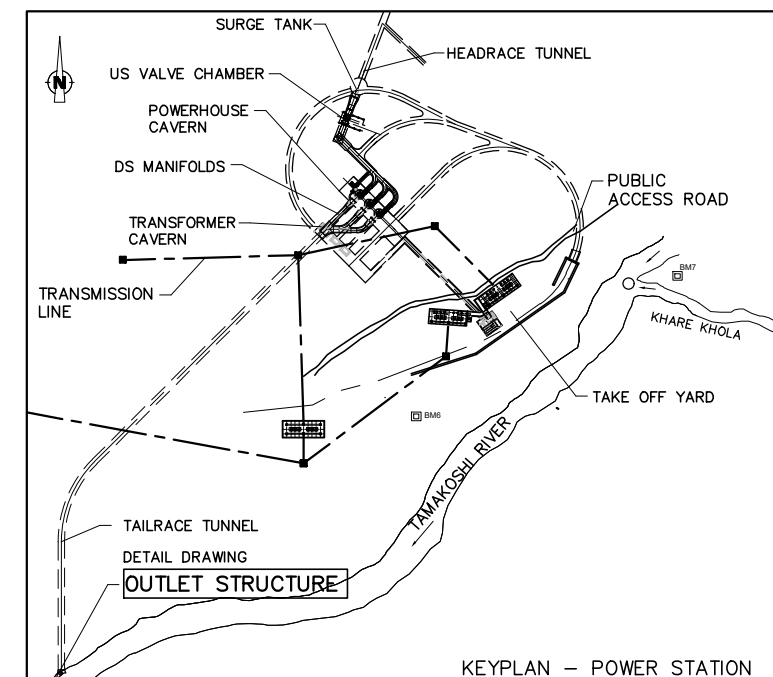
| Name | Date | DETAILLED DESIGN |
|---|------------------------------------|------------------------------------|
| Prepared B. Khadka | 31.07.17 | OUTLET STRUCTURE |
| Drawn B. Khadka | | OUTLET STRUCTURE |
| Checked Roloff | | HORIZONTAL SECTION SECTION B AND D |
| Approved Dr. Moeller | | PROJECT DRAWING |
| Replaces Drwg. No: 31-00053-DD-4358-Y-0000_ | | |
| CAD- File No.: | | |
| Scale A3: 1:400/200 | Drwg. No.: 31-00053-DD-4358-Q 1393 | REV. - |

NOTES:

1. ALL DIMENSIONS ARE IN METERS [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).

DRAFT STATUS:
01.11.2018

SCALE
-2 0 2 4 6 8 10 [m]
1:200

**Reference Drawings**

| Drwg. No. | Title |
|-----------------------|--------------------------|
| 31-00053-DD-4358-1390 | OUTLET STRUCTURE, LAYOUT |

Revisions

| No. | Name | Date | Notes |
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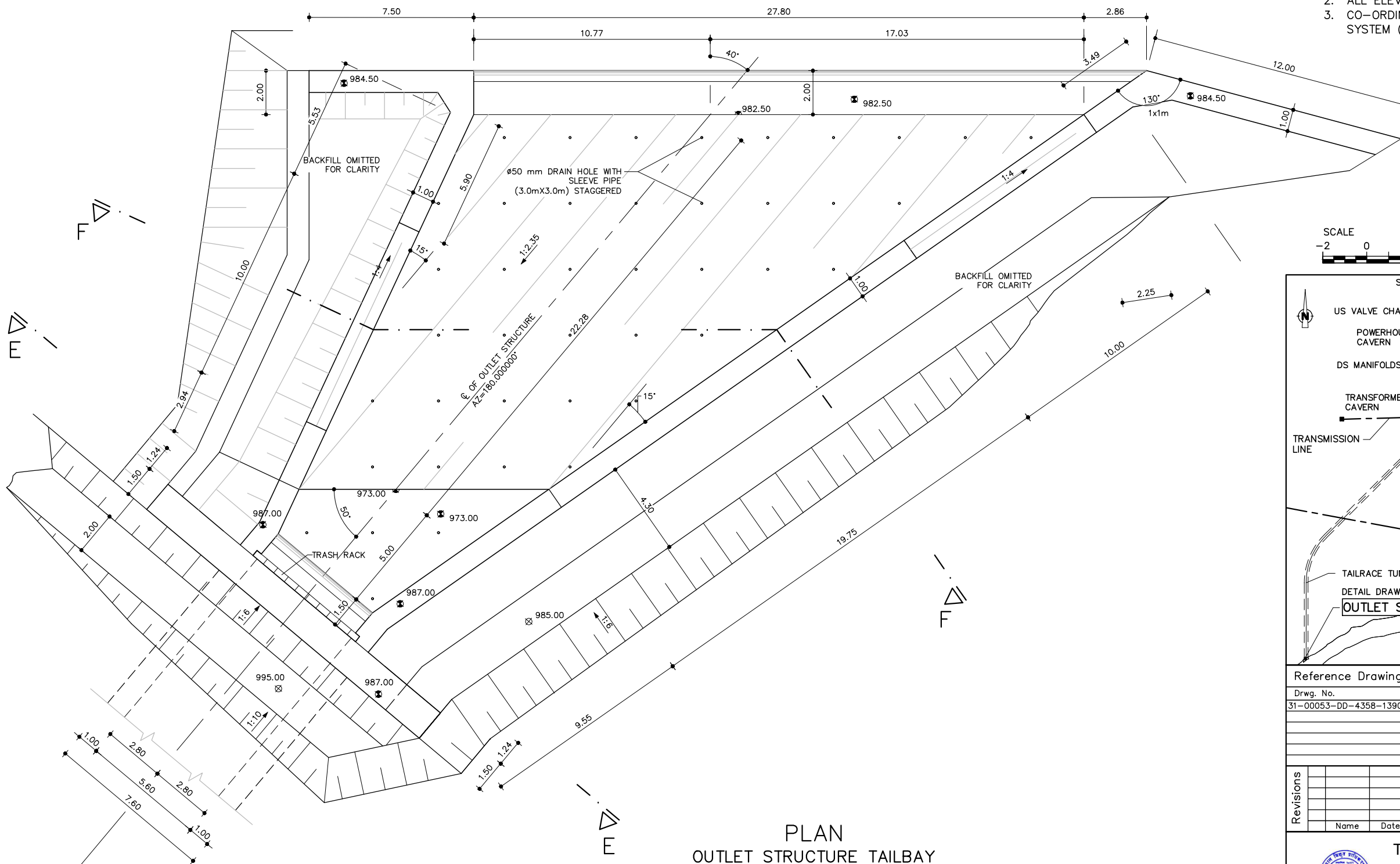
TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



CONSULTING ENGINEERS
BAD VILBEL, GERMANY

**TAMAKOSHI V HYDROELECTRIC PROJECT
DETAILED ENGINEERING DESIGN**

| | Name | Date | |
|--|-------------|------------------------------------|--------------------|
| Prepared | B. Khadka | 31.07.17 | DETAILED DESIGN |
| Drawn | B. Khadka | | OUTLET STRUCTURE |
| Checked | Roloff | | TAILBAY |
| Approved | Dr. Moeller | | LAYOUT, HORIZONTAL |
| Replaces Drwg. No: 31-00053-DD-4358-Y-0000_ | | | SECTION |
| CAD- File No.: | | | PROJECT DRAWING |
| Scale A3: | 1:200 | Drwg. No.: 31-00053-DD-4358-Q 1394 | REV. - |

**LEGEND:**

- CONCRETE CLASS C1 - CONCRETE C25/30
- CONCRETE CLASS F - BLINDING CONCRETE C12/15
- CONSTRUCTION JOINTS
- UNFINISHED TOP OF SLAB
- FINISHED FLOOR LEVEL
- FIXPOINT-COORDINATE

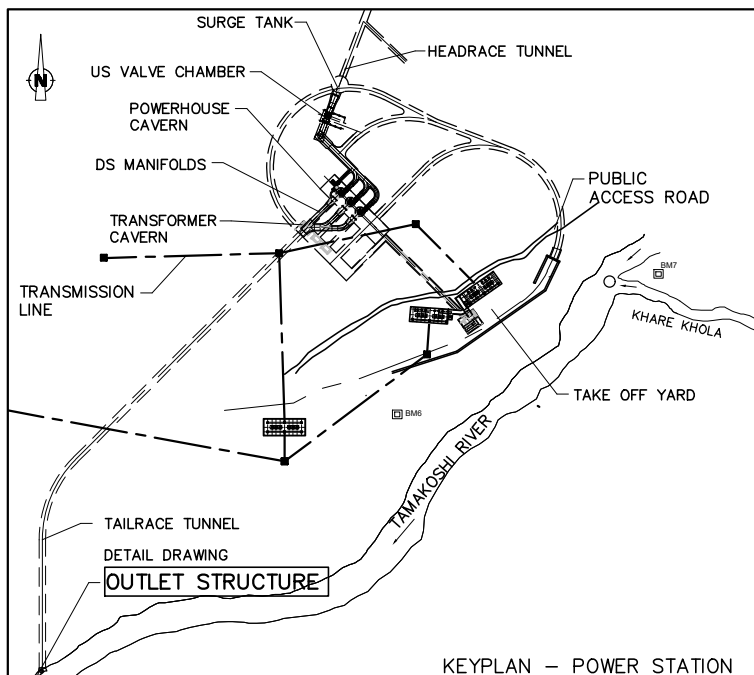
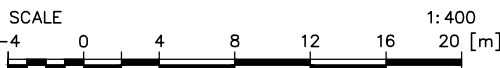
NOTES:

1. ALL DIMENSIONS ARE IN METERS [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. CO-ORDINATES BASED ON NATIONAL GEODETIC NETWORK SYSTEM (EVEREST 1830).

LEGEND:

- CONCRETE CLASS C1 – CONCRETE C25/30
- CONCRETE CLASS F – BLINDING CONCRETE C12/15
- CONSTRUCTION JOINTS
- UNFINISHED TOP OF SLAB
- FINISHED FLOOR LEVEL
- FIXPOINT-COORDINATE

DRAFT STATUS:
01.11.2018



Reference Drawings

| Drwg. No. | Title |
|-----------------------|--------------------------|
| 31-00053-DD-4358-1390 | OUTLET STRUCTURE, LAYOUT |

Revisions

| No. | Name | Date | Notes |
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TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT
DETAILED ENGINEERING DESIGN

| | Name | Date |
|--|-------------|----------|
| Prepared | B. Khadka | 31.07.17 |
| Drawn | B. Khadka | |
| Checked | Roloff | |
| Approved | Dr. Moeller | |
| Replaces Drwg. No: 31-00053-DD-4358-Y-0000_ | | |

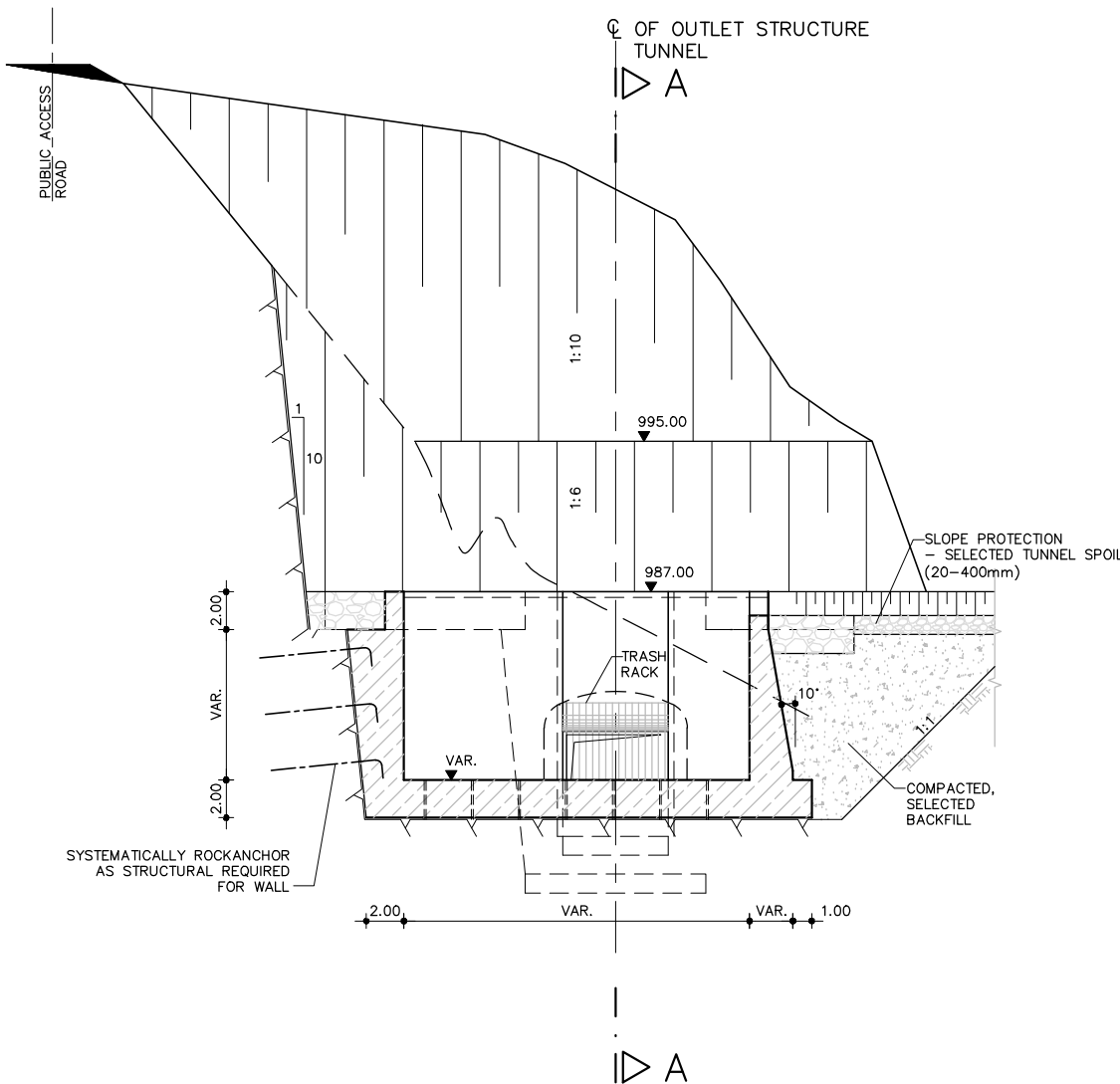
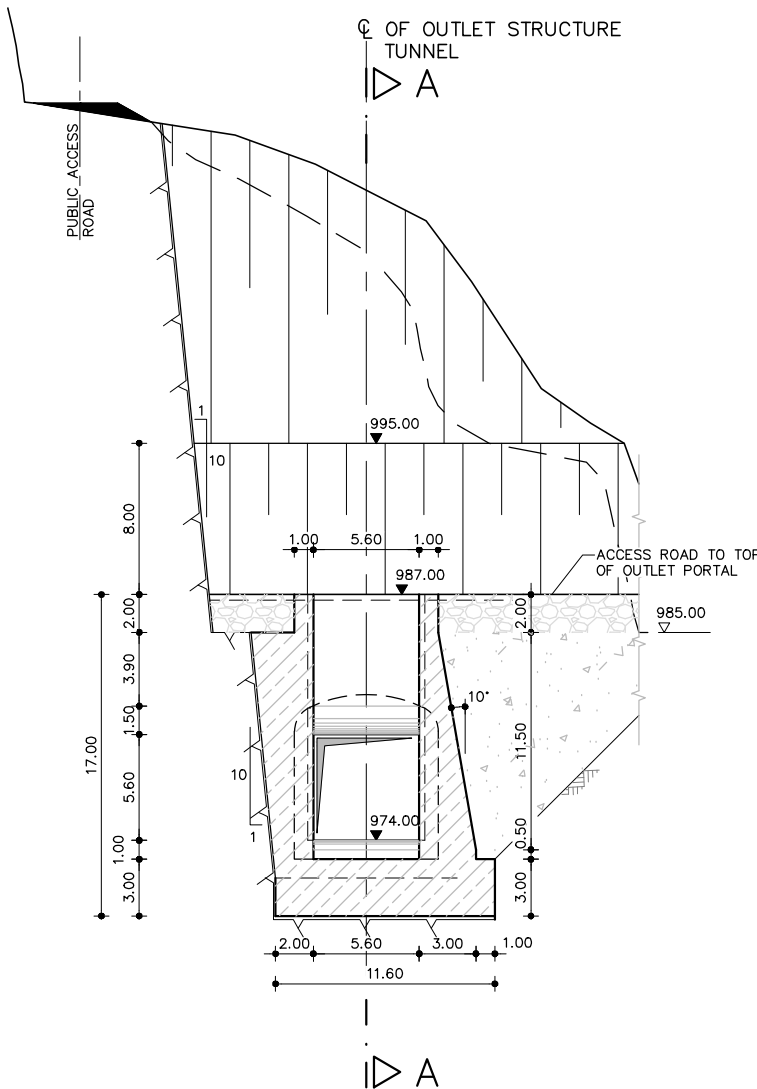
CAD- File No.:

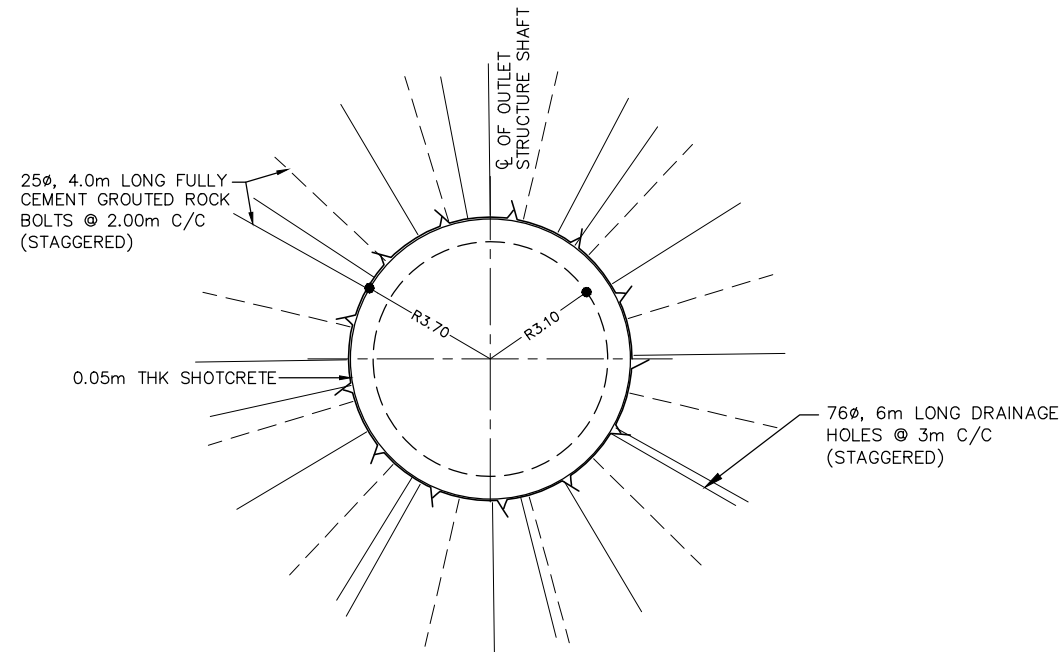
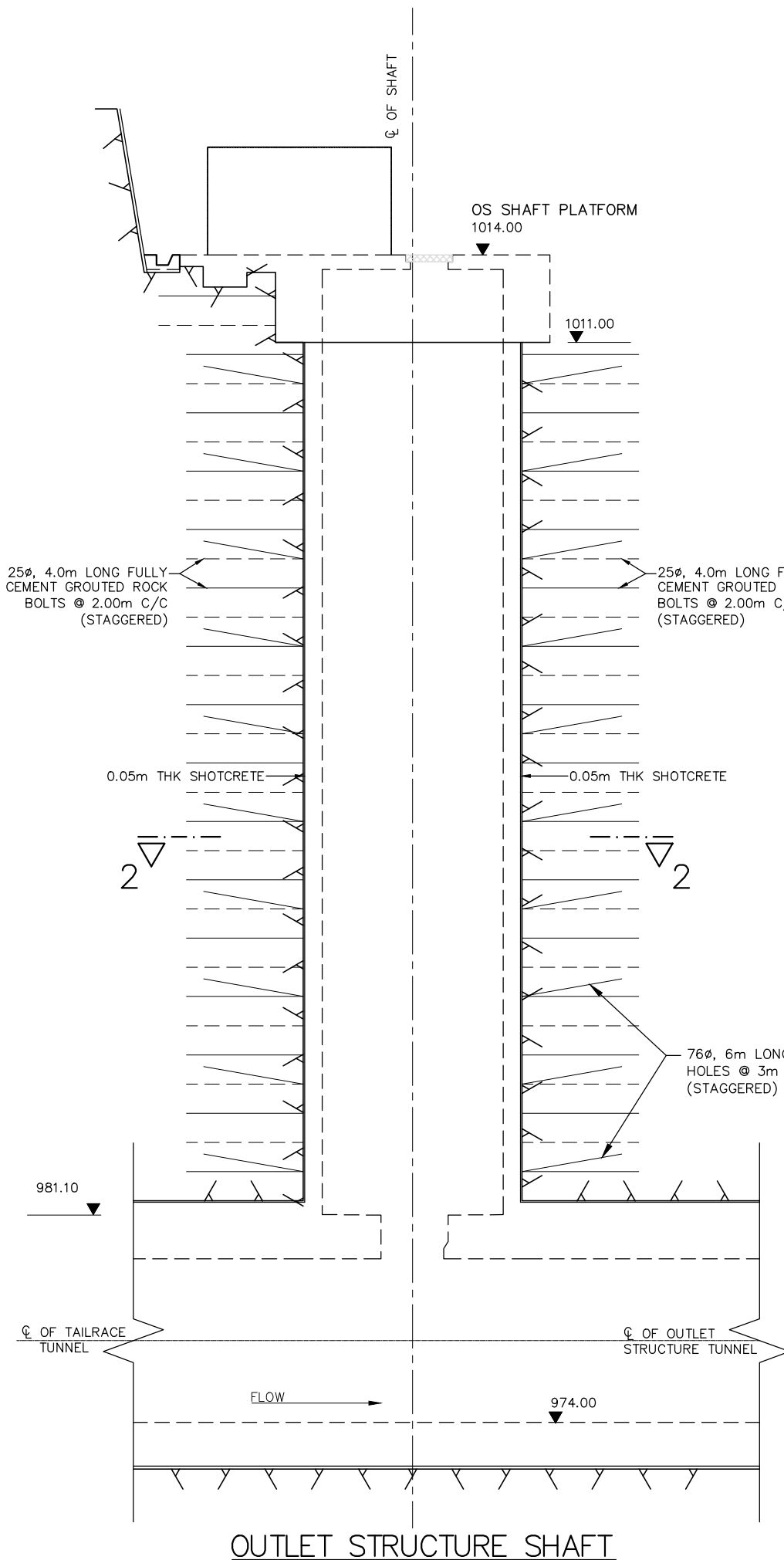
Scale A3: 1:400

DETAILED DESIGN
**OUTLET STRUCTURE
TAILBAY
SECTIONS**

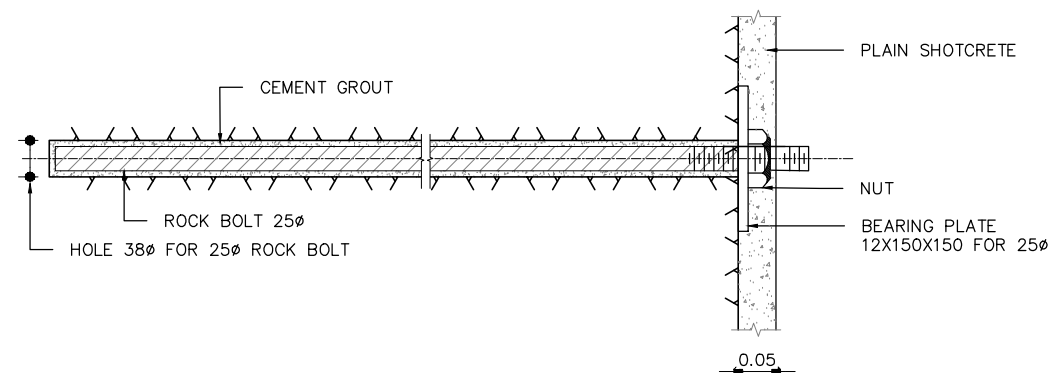
PROJECT DRAWING

Drwg. No.: 31-00053-DD-4358-Q 1395 REV. —





SECTION 2-2



TYPICAL ROCK BOLT AND SHOTCRETE DETAILS
NOT TO SCALE

NOTES ON ROCKSUPPORT:

- EXTERNAL DIMENSIONS REFER TO THE SHOTCRETE LINE = THE CLEAR PROFILE OF THE STRUCTURE. THE EXCAVATION LINE HAS TO BE ADJUSTED ACCORDING TO THE ACTUAL GEOLOGICAL CONDITIONS.
- ALL SHOTCRETE SHALL BE PLAIN SHOTCRETE.
- FULLY CEMENT GROUTED ROCK BOLTS SHALL HAVE THE FOLLOWING CHARACTERISTICS:
 - DIA. 25 MM
 - YIELD STRENGTH 500 N/MM²
 - MAXIMUM TENSILE CAPACITY 213 KN
- ROCK SUPPORT MEASURES SHOWN ON THIS DRAWING ARE PRELIMINARY ONLY. FINAL ARRANGEMENT OF ROCK SUPPORT (SHOTCRETE THICKNESSES; LENGTH, ORIENTATION AND GRID OF ROCK BOLTS) HAVE TO BE ADOPTED TO ACTUAL GEOTECHNICAL CONDITIONS, SUBJECT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR.
- 10 NOS. PRESTRESSED ROCK ANCHORS WITH A LENGTH OF 20 M AND A WORKING LOAD OF 1,000 KN HAVE TO BE AVAILABLE ON SITE FOR UNEXPECTED GEOTECHNICAL CONDITIONS.
- INTERSECTING TUNNELS ON THE LAST 12M BEFORE ENTERING THE CHAMBER SHALL BE SUPPORTED 1 RS HIGHER THAN WOULD BE APPLICABLE ACCORDING TO THE GEOLOGY.
- ROCKSUPPORT ON THE PERIPHERY OF INTERSECTING TUNNEL DEPENDS ON SEQUENCE OF EXCAVATION AND SHALL BE MODIFIED BY THE ENGINEER AT SITE PRIOR APPLYING.

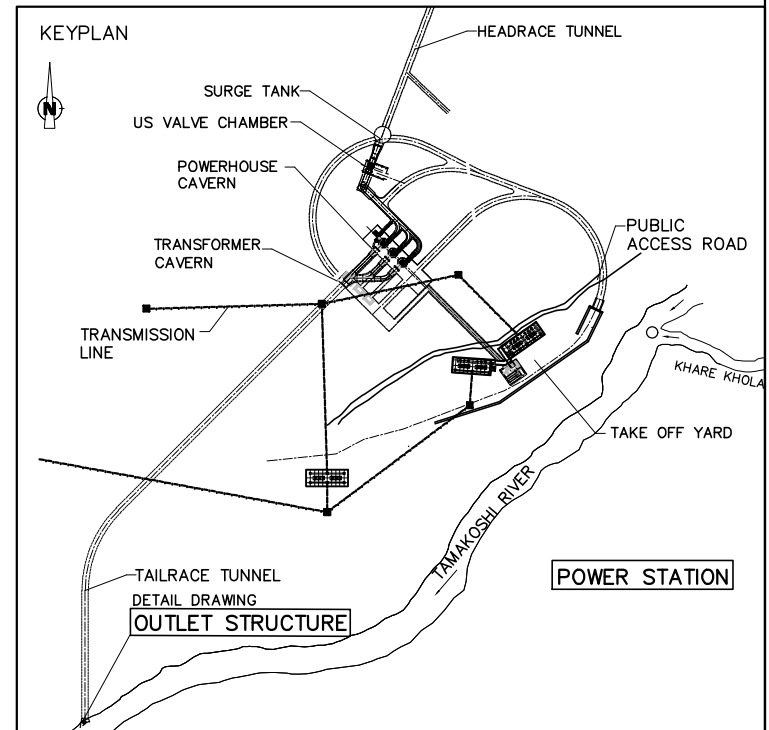
DRAFT STATUS:
21.09.2018

NOTES:

- ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
- ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].

NOTES DRAIN HOLES:

- DRAIN HOLES SHALL BE DRILLED AFTER INSTALLATION OF BOLTS
- DRAIN HOLES L=6.00 m, INCLINED 5° DIA Ø76 mm
- DRAIN HOLE SHALL BE EQUIPPED WITH SUITABLE FILTER PIPES (SLOTTED PVC PIPES WRAPPED WITH GEOTEXTILE)
- PATTERN 9 m² (3.00 BY 3.00).
- DRAIN HOLE PATTERN MAY BE ADJUSTED ON SITE TO SUIT WATER INFLOW FROM PARTICULARLY PERMEABLE ROCK STRATA. DRAIN HOLES IN THE CAVERN VAULT SHALL BE ALIGNED VERTICALLY, TO ALLOW FOR DIRECT CONNECTION OF VERTICAL COLLECTING PIPES.



Reference Drawings

| Drwg. No. | Title |
|-----------------------|--------------------------|
| 31-00053-DD-4358-1390 | OUTLET STRUCTURE, LAYOUT |

| Revisions | Name | Date | Notes |
|-----------|------|------|-------|
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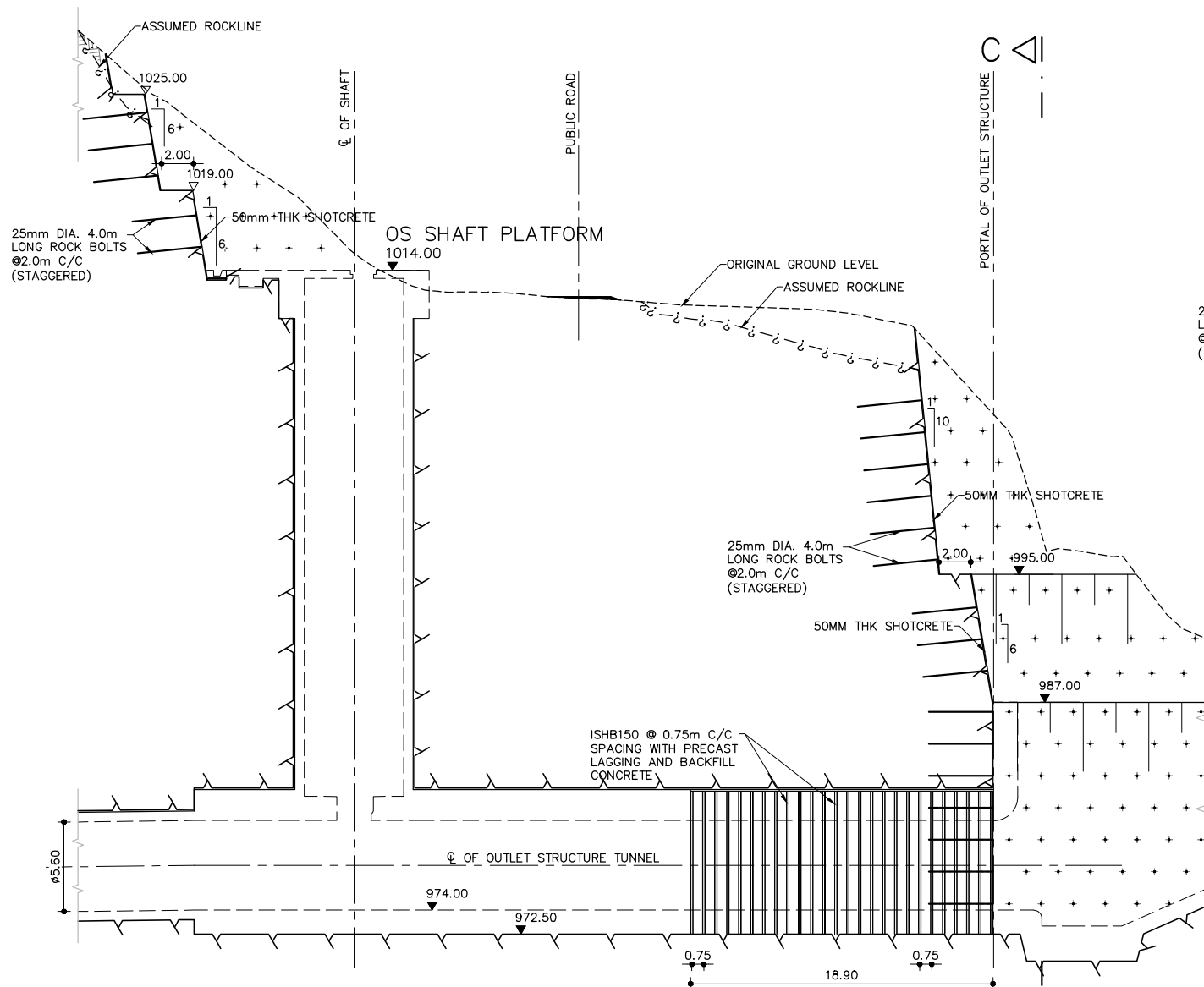
TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



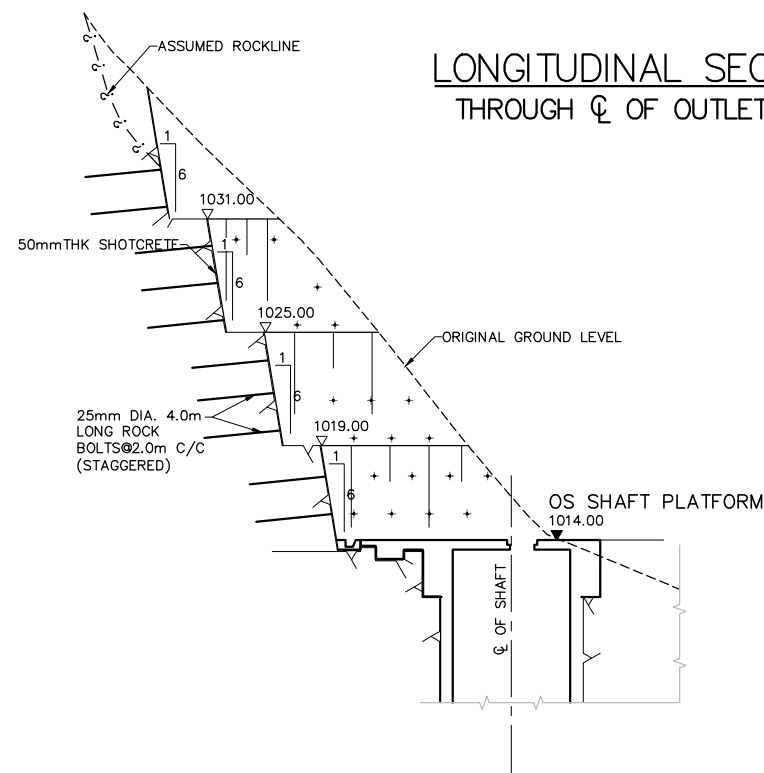
CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

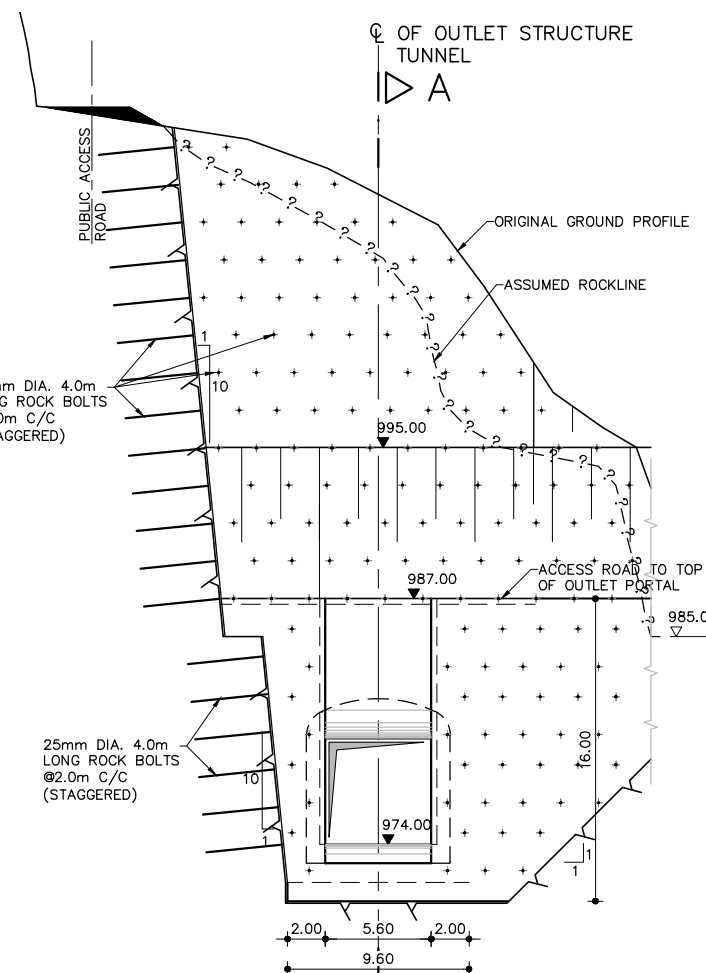
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| | Name | Date | DETAILED DESIGN | |
| Prepared | R. Shrivastava | 21.09.18 | <u>OUTLET STRUCTURE</u> <u>OUTLET STRUCTURE SHAFT</u> ROCK SUPPORT DETAILS | |
| Drawn | A. K. Basu | 21.09.18 | | |
| Checked | Roloff | 21.09.18 | | |
| Approved | Dr. Moeller | 21.09.18 | | |
| Replaces Drwg. No: 31-00053-DD-4358-Y-0000_— | | | PROJECT DRAWING | |
| <u>CAD- File No.:</u> | | | | |
| Scale A3: | 1:200 | Drwg. No.: 31-00053-DD-4358— | S 1396 | REV. — |



LONGITUDINAL SECTION A-A
THROUGH \mathcal{Q} OF OUTLET STRUCTURE



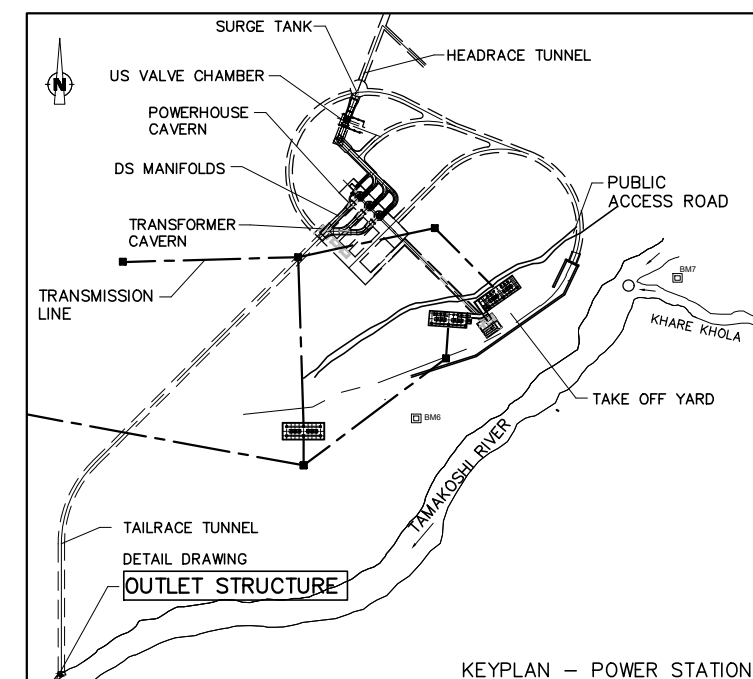
SECTION B-B
PORTAL SLOPE OF OUTLET STRUCTURE SHAFT



SECTION C-C
ELEVATION OUTLET STRUCTURE

NOTES:

1. ALL DIMENSIONS ARE IN METER [m] UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE ABOVE SEA LEVEL IN [masl].
3. EXTERNAL DIMENSIONS REFER TO THE SHOTCRETE LINE = THE CLEAR PROFILE OF THE STRUCTURE. THE EXCAVATION LINE HAS TO BE ADJUSTED ACCORDING TO THE ACTUAL GEOLOGICAL CONDITIONS.
4. ALL SHOTCRETE SHALL PLAIN SHOTCRETE WITH WIREMESH IF ASSIGNED IT ACCORDING TO ROCK SUPPORT.



KEYPLAN - POWER STATION

Reference Drawings

| Drwg. No. | Title |
|-----------------------|---|
| 31-00053-DD-4356-1370 | DOWNSTREAM POWER WATERWAYS, GENERAL, LAYOUT |

| Revisions | Name | Date | Notes |
|-----------|------|------|-------|
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TAMAKOSHI V HYDROELECTRIC PROJECT
PROJECT DEVELOPMENT DEPARTMENT
ENGINEERING SERVICES DIRECTORATE
NEPAL ELECTRICITY AUTHORITY



CONSULTING ENGINEERS
BAD VILBEL, GERMANY

TAMAKOSHI V HYDROELECTRIC PROJECT DETAILED ENGINEERING DESIGN

| Name | Date | DETAILLED DESIGN |
|--|-------------------------------------|-------------------------------------|
| Prepared R. Shrivastava | 26.09.18 | OUTLET STRUCTURE |
| Drawn A K Basu | 26.09.18 | OUTLET STRUCTURE PORTAL |
| Checked Roloff | 26.09.18 | LONGITUDINAL SECTION A-A, B-B & C-C |
| Approved Dr. Moeller | 26.09.18 | ROCK SUPPORT |
| Replaces Drwg. No: 31-00053-DD-4358-Y-0000-- | | PROJECT DRAWING |
| CAD- File No.: | | |
| Scale A3: 1:400 | Drwg. No.: 31-00053-DD-4358- S 1398 | REV. - |

NOTES TO ROCK SUPPORT:

1. ROCK BOLTS SHALL HAVE THE FOLLOWING CHARACTERISTICS:
 - DIA. 25 MM
 - YIELD STRENGTH 500 N/MM²
 - MAXIMUM TENSILE CAPACITY 213 KN
2. THE SHOTCRETE MIX SHALL HAVE 28 DAYS OF COMPRESSIVE STRENGTH OF 35MPa.
3. STEEL RIBS SHALL CONFORM TO IS:226-1975.
4. AN ADDITIONAL LAYER OF 50MM THK PLAIN SHOTCRETE SHALL BE APPLIED ON THE EXPOSED PARTS OF STEEL RIBS FOR PROTECTION AGAINST CORROSION.
5. ROCK SUPPORT MEASURES SHOWN ON THIS DRAWING ARE PRELIMINARY ONLY. FINAL ARRANGEMENT OF ROCK SUPPORT (SHOTCRETE THICKNESSES; LENGTH, ORIENTATION AND GRID OF ROCK BOLTS) HAVE TO BE ADOPTED TO ACTUAL GEOTECHNICAL CONDITIONS, SUBJECT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR.
6. THE APPLICATION OF ROCK SUPPORT CLASSES (RSC) DEPENDS ON THE ACTUALLY ENCOUNTERED CONDITIONS AND GEOTECHNICAL MONITORING AND SHALL BE DECIDED BY THE RESPONSIBLE SECTION ENGINEER/GEOLOGIST.
7. CONTOUR BLASTING HAS TO BE DONE SMOOTHLY WITH MINIMUM DAMAGE TO THE REMAINING ROCKMASS AND AVOIDING OVERBREAKS AS MUCH AS POSSIBLE.
8. BOLT ORIENTATION SHALL BE ADAPTED TO ENCOUNTERED REQUIREMENTS, INSTALLED PERPENDICULAR TO THE ADIT PROFILE, IF DEVIATION FROM VERTICALITY REQUIRED SHALL BE RESTRICTED BELOW 30°.

DRAFT STATUS:
30.09.2018